

THE NEARCTIC GENUS *NEBRITUS* COQUILLETT (DIPTERA: THEREVIDAE: THEREVINAE)

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Abstract.—The species of the genus *Nebritus* Coquillett are revised. *Nebritus powelli* new species from coastal California is described. A key to the species is provided along with descriptions and distributions of the three species in this genus.

Key Words: Diptera, stiletto flies, Therevidae, *Nebritus*, Nearctic revision, species keys, descriptions, distributions

A monograph of the Nearctic genera of Therevidae (Irwin and Lyneborg 1981a) described several new taxa and redescribed others. This paper is the third in a series (Webb and Irwin 1988, 1991) revising the species of the genera treated in that monograph. The Nearctic genus *Nebritus* Coquillett (1894: 98) has as its type species by original designation *N. pellucidus* Coquillett. At present, two species have been described and attributed to *Nebritus* (Irwin and Lyneborg 1981a). A third species is described in this paper.

The morphological terminology used for the male terminalia was originally defined and described by Lyneborg (1968) and subsequently modified by Lyneborg (1972, 1976, 1978) and Irwin (1977a, b); that for the female terminalia was defined and described by Irwin (1976); that for the larva and pupa follows Irwin (1972, 1973). Other morphological features are described in terminology set out in the "Manual of Nearctic Diptera" (McAlpine 1981). The range for each setal count is followed by the mode (setal counts are taken from the left side of the specimen and, if the setal count is followed by a count in parentheses, it indicates a difference in counts between the left and right sides of the same specimen).

Each specimen was assigned a unique THEREVIDAE/M. E. IRWIN/SPECIMEN number. This number has been used to associate ecological and label data with a given specimen and when referred to, herein, is printed in italics. The data are to be incorporated into an automated data management system originally designed by Rauch (1970). To conserve space and include as much information as possible about each specimen, a format adopted from Irwin (1983) is used in the "Specimens Examined" section of each species. Many of the terms used there are defined by Stuckenberg and Irwin (1973). In the presentation of locality data, a semicolon terminates one series of specimens and signals the beginning of the next. Data not repeated in a series are the same as those of preceding series.

Specimens have been deposited in the following museums and collections: American Museum of Natural History (AMNH); Arizona State University (ASUT); Brigham Young University (BYU); California Academy of Sciences (CAS); Illinois Natural History Survey (INHS); Los Angeles County Museum (LACM); Michael E. Irwin Collection (MEI); Oregon State University (OSUC); United States National Museum

(USNM); University of California, Berkeley/California Insect Survey Collection (UCB/CIS); University of California, Davis (UCD); University of California, Riverside (UCR); University of Minnesota (UMSP); University of Wisconsin (UWM); Utah State University (USUL).

Nebritus may be separated from other Nearctic therevids by using the keys to the genera of Nearctic Therevidae in Irwin and Lyneborg (1981a, b).

Nebritus Coquillett

Nebritus Coquillett (1894: 98). Type species: *Nebritus pellucidus* Coquillett (1894: 98) by original designation.

Zionea Hardy (1938: 144). Type species: *Zionea tanneri* Hardy (1938: 144) by original monotypy. Synonymized by Irwin and Lyneborg (1981a: 249).

Derivation of name.—*nebrites* (Greek, feminine) = like a fawn skin.

Diagnosis.—The genus *Nebritus* Coquillett is associated with the genera *Dialineura* Rondani and *Pallicephala* Irwin and Lyneborg by possessing fine setae on the posterior surface of the middle coxae, by having the prosternum with fine setae in and around its central depression (exception *P. quebecensis*), and with the scape being wider than the width of the first flagellomere. It is separated from these two genera in not having the posterolateral corners of the epandrium strongly projecting nor the epandrium extending to or beyond the apex of the cerci or hypoproct. At this time, no definitive sister-group relationship is proposed for *Nebritus* with any other therevid genus.

Small- to medium-sized, robust flies. Males more slender and smaller than females.

Description.—**Head** (Fig. 1): Eyes dichoptic in both sexes, facets equal; antenna (Figs. 2, 14, 30), length 1.0–1.4 times head length; scape variable; pedicel ovate; flagellum awl-shaped, tapered apically; style subapical, one-segmented; terminal spine

short; frons broad, lateral margins converge dorsally; frontal calli prominent; parafacial broad, tentorial pit large, distinct, glossy; clypeus concave; maxillary palp one-segmented (Fig. 3), cylindrical, apex rounded; setae scattered over entire frons, abundant on gena and maxillary palp, absent on eyes, parafacial, and clypeus.

Thorax: Macrosetae: np 2–4, sa 1–3, pa 1, dc 1–2, sc 2. Setae on scutum variable; prosternal setae white; setae abundant on propleuron, scattered over entire anepisternum and katepisternum, absent on remaining pleural sclerites. **Wing** (Fig. 4): Hyaline to pale smoky brown; veins brown; pterostigma indistinct to pale brown; setulae absent; length of R_4 0.9–1.0 times length of R_5 ; cell r_4 large; length of cell r_4 2.5–3.1 times width; veins M_1 , M_2 , and M_3 originate separately from apical margin of discal cell; cell m_3 widely open; discal cell acute basally; 5 posterior cells; cell cup closed with short petiole; m-cu/r-m subequal. **Legs:** Coxae moderately long; setae elongate, scattered on anterior and posterior surfaces of coxae; forecoxa with 2–3 black, apical macrosetae.

Abdomen: Slender to moderately broad, gradually tapering from segment 3 onward; male dorsum silvery gray pruinose; female dorsum extensively gray pruinose, some species with a distinct, dark, glossy, anterior band on various tergites. **Male terminalia** (Figs. 5–10, 15–20, 31–36): Tergite 8 subrectangular to bilobed (Figs. 5, 15, 31), often strongly constricted medially; sternite 8 (Figs. 7, 17, 33) rectangular to bilobed, moderately reduced; epandrium (Figs. 5, 15, 31) shorter medially than wide, its posterolateral corners infolded; cerci rather large, free, well sclerotized, generally not extending beyond apex of hypoproct; hypoproct large, extending nearly to anterior margin of epandrium with a membranous attachment to anterior margin of dorsal apodeme of aedeagus; hypoproct as a whole well sclerotized, occasionally keel-shaped apically below cerci; parameral apodeme (Figs. 6, 16, 32) not attached to aedeagus; distiphall-

lus (Figs. 8–10, 18–20, 34–36) rather long compared to rest of aedeagus, downcurved; dorsal apodeme broad, anterior margin deeply emarginate; ventral apodemes small, not bifurcated medially; ejaculatory apodeme variable; ventral lobes of gonocoxites large, spoon shaped, directed obliquely upward, with distinct attachment to ventral surface of aedeagus; parameral process (Figs. 6, 7, 16, 17, 32, 33) long and slender; gonocoxites (Figs. 7, 17, 33) not united ventrally except by a membrane; gonocoxite in lateral view broadly rounded posteriorly; hypandrium (Figs. 6, 7, 16, 17, 32, 33) broad throughout, united with anterior margin of gonocoxites for a rather long distance. **Female terminalia** (Figs. 11, 12, 21, 22, 37, 38): Tergite 8 subrectangular, generally longer than wide, posterior margin slightly emarginate. Tergite 9+10 fused, with strong acanthophorite setae. Cercus subtriangular, membranous with numerous, fine, moderately long setae. Sternite 8 large; longer than wide; posterior margin with narrow, median incision. Sternite 9 greatly modified, invaginated above sternite 8 to form internal furca which is closed anteriorly. Sternite 10 membranous; subtriangular; setae short, thick.

Immature stages.—Not previously described. Here described for *Nebritus powelli*.

Biology.—Adults of *Nebritus* are found in montane habitats and coastal sand dunes. They have been collected from 10 January to 27 July on coastal dunes, on wet sand, and along sandy creek bottoms; on *Pinus monophylla* Torr. and Frém. in Frém., *Salix* sp., and *Adenostoma* sp.; and in Malaise traps. Larvae have been collected in coastal sand dunes.

Distribution (Figs. 39–41).—*Nebritus* is a Nearctic genus ranging from Baja California Norte to northern California and eastward to western Nevada and southwestern Utah.

KEY TO SPECIES OF *NEBRITUS*

- 1. Scape enlarged (Figs. 1, 2), swollen basally, distinctly wider than width of flagellum, dark yel-

- low ventrally, dark reddish brown dorsally, glossy *pellucidus* Coquillett
- Scape cylindrical, elongate (Figs. 14, 30), dark brown, gray pruinose 2
- 2. Thorax with broad median longitudinal band of white setae; scutellum with lateral patch of white setae .. *powelli* Webb and Irwin, new species
- Median area of thorax with scattered dark reddish brown setae; scutellum with lateral patch of gold setae *tanneri* (Hardy)

Nebritus pellucidus Coquillett

Nebritus pellucidus Coquillett (1894: 98); Cole (1923: 18, 1965: 349); Irwin and Lyneborg (1981a: 249). Type locality: southern California.

Derivation of name.—*pellucidus* (Latin) = clear, transparent.

Diagnosis.—*Nebritus pellucidus* can be readily distinguished from *N. powelli* and *N. tanneri* in that the males and females have large, glossy, and basally expanded scapes, the ventral half of which is dark yellow and the dorsal half reddish brown; the length of the scape is greater than 0.8 mm; the length/width ratio of the scape is less than 3.5; the ventral half of the frons enlarged to form a distinctive expanded lobe; and the scutellum is dark reddish brown, subshiny, with a lateral longitudinal pollinose band.

Description of lectotype male (7041).—Body length 7.0 mm.

Head (Fig. 1): Length 1.3 mm. Ocellar tubercle dark reddish brown, glossy; ocellar setae black, elongate, scattered. Eyes reddish brown; median margin of eyes sinuate. Frons broad, ventral half expanded anterolaterally to form large lobe; pollinose on dorsal two-thirds, ventral third dark reddish brown, glossy; setae dark reddish brown. Antenna (Fig. 2) elongate, scape glossy, dark yellow ventrally, dark reddish brown dorsally, pedicel and flagellum dark reddish brown; moderately thick, black setae on scape, pedicel, and scattered basally on flagellum; macrosetae dark reddish brown, scattered on scape; length of antenna 1.3 times head length; scape large, expanded

basally, tapered apically, length 0.94 mm, 2.9 times width, 6.7 times length of pedicel; length of pedicel 0.14 mm, 0.9 times width; length of flagellum 0.64 mm, 4.0 times width, 0.7 times length of scape; style subapical in lateral cavity, length 0.10 mm. Parafacial pollinose with median and tentorial pit areas dark reddish brown, glossy. Genal setae white. Maxillary palp (Fig. 3) pale yellow; length 0.44 mm, 6.7 times width; setae pale yellow. Postocular setae dark gold, elongate, lanceolate with scattered black macrosetae.

Thorax: Macrosetae: np 4, sa 2, pa 1, dc 1, sc 2. Black, gray pruinose; setae black, fine, scattered with dark gold lanceolate setae on acrostichal line, laterally, and across anterior margin of scutum; vittae black, dorsocentral and dorsolateral vittae separated by pale gold stripe. Postpronotal lobe dark reddish brown, gray pruinose; setae dark gold, lanceolate. Prosternal setae white. Pleuron dark reddish brown, dense gray pruinose; setae white, elongate, abundant on propleuron, scattered over entire anepisternum and katapisternum. Scutellum dark reddish brown, subshiny with broad, lateral, longitudinal pollinose band; setae dark gold, lanceolate, clustered laterally. Laterotergite dark reddish brown, whitish gray pruinose; setae white. **Wing** (Fig. 4): Length 5.8 mm, 3.9 times width; hyaline; pterostigma pale yellowish brown. Halter pale yellowish brown. **Legs:** Coxae dark reddish brown, dense whitish gray pruinose, apical macrosetae dark reddish brown. Femora dark yellow, glossy; setae on fore and middle femur dark reddish brown, elongate, scattered, mixed dorsally with white, elongate setae and scattered, white, short, appressed, scale-like setae; hind femur with short, dark reddish brown setae mixed dorsally with white, short, appressed, scale-like setae. Tibiae dark yellow, subshiny, apex reddish brown. Tarsi dark reddish brown, basal two-thirds of tarsomere 1 dark yellowish brown.

Abdomen: Dark reddish brown, dense gray pruinose; dorsal setae pale yellowish gold;

lateral setae pale yellow, becoming dark reddish brown on posterior tergites. **Terminalia:** Dark yellowish orange, glossy (Figs. 5–10). Tergite 8 bilobed, deeply constricted medially. Sternite 8 reduced, subquadrate. Gonocoxite in ventral view without posteromedian patch of black setae. Dorsal apodeme of aedeagus with large anteromedial emargination. Ejaculatory apodeme broadly expanded anteriorly.

Variation: Body measurements given in Table 1. **Thorax:** Macrosetae: np 3–4, 3, sa 2, pa 1, dc 1, sc 2.

Description of female.—Similar to male with following exceptions. Body measurements given in Table 1.

Head: Median margin of eye sinuate. **Thorax:** Macrosetae: np 3, sa 1–2, 2, pa 1, dc 1–2, 1 sc 2. Gold setae across anterior margin of mesonotum. **Legs:** Tibiae and tarsi dark reddish brown. **Terminalia** (Figs. 11, 12): Furca (Fig. 12) quadrate; posterior and anterior margins truncate; lateral margins sinuate.

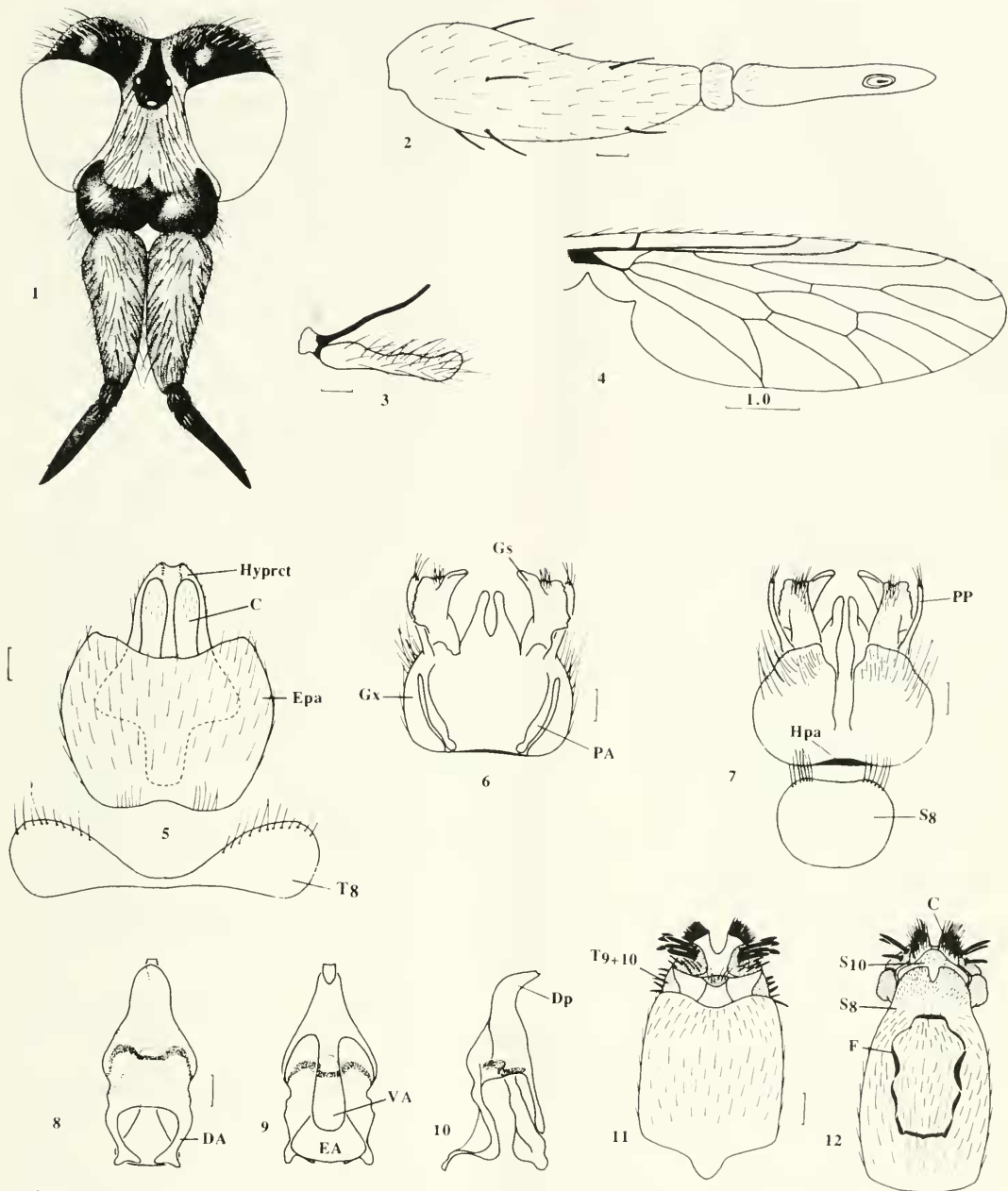
Immature stages.—Unknown.

Seasonal activity.—In the specimens examined, adults were collected from 12 April to 13 July. Adults have been collected on *Adenostoma* sp., on wet sand, and in Malaise traps.

Distribution (Fig. 39).—*Nebritus pellucidus* ranges from Baja California Norte to north-central California.

Specimens examined (N = 177).—**Type material:** A syntypic series of four males and two females of *Nebritus pellucidus* Coquillett is in the U.S. National Museum (Type Number 10424). A male of this series, here designated lectotype (and labeled as M. E. Irwin Therevidae Specimen Number 7041), was collected in Los Angeles County, California, in April.

Other material: MEXICO. **Baja California Norte:** Arroyo Santo Domingo, 9 km E Hamilton Ranch at dam site, 23-IV-1963, H. B. Leech & P. H. Arnaud, 1 ♂, 1 ♀. UNITED STATES. CALIFORNIA. **Kern County:** Indian Wells Canyon, west of Highway 6



Figs. 1–12. *Nebritus pellucidus* (6051, 6112) 1. Male head, dorsal view. 2. Male antenna, lateral view. 3. Male maxillary palp, lateral view. 4. Male wing, dorsal view. 5. Male tergite 8, epandrium, cerci, and hypoproct, dorsal view. 6. Male hypandrium, gonocoxite and gonostylus, dorsal view (aedeagal complex removed). 7. Male sternite 8, hypandrium, gonocoxite and gonostylus, ventral view. 8. Male aedeagus, dorsal view. 9. Male aedeagus, ventral view. 10. Male aedeagus, lateral view. 11. Female terminalia, dorsal view. 12. Female terminalia, ventral view. Abbreviations: Cerci (C); Distiphallus (Dp); Dorsal Apodeme (DA); Ejaculatory Apodeme (EA); Epandrium (Epa); Furca (F); Gonocoxite (Gx); Gonostylus (Gs); Hypoproct (Hypret); Parameral Apodeme (PA); Parameral Process (PP); Sternite 8 (S₈); Sternite 10 (S₁₀); Tergite 8 (T₈); Tergite 9 + 10 (T₉₊₁₀); Ventral Apodeme (VA). Scale = 0.1 mm, unless otherwise indicated.

km N Inyo, Kern turnoff, 12-IV-1960, C. A. Toschi, 1 ♂; Bryson, 18-V-1920, E. P. Van Duzee, 3 ♂, 2 ♀; 8 km N Kernville, 15-V-1963, S. W. Earnshaw, 2 ♀; **Los Angeles County:** April, 2 ♂; June, 2 ♀; San Timoteo Canyon, R. A. Flock, 1 ♀, on *Adenostoma* sp.; Tanbark Flat, 25-VI-1956, R. C. Bechtel, 26 ♂, 11 ♀; H. R. Moffit, 14 ♂, 8 ♀; 13-VII-1956, B. M. Bartoch, 1 ♂; 30-VI-1950, H. F. Robinson, 1 ♀; 4-VII-1950, G. S. Payne; 27-VI-1950, W. C. Bentineck, 2 ♀; 20-VI-1956, J. I. Stage, 1 ♀; Angeles Crest, 10-VI-1949, 1 ♀; Big Dalton Canyon, 23-VII-1952, A. T. McClay, 1 ♀; 15-VII-1956, E. I. Schlinger, 1 ♂; 15-VII-1956, E. I. Schlinger, 1 ♀; Big Dalton Dam, 25-VI-1950, G. S. Payne, 2 ♀; Tie Canyon, Los Angeles National Forest, 17-VI-1966, M. E. Thompson, 3 ♂. **Madera County:** Oakhurst, 26-V-1942, S. H. Benedict, 1 ♀. **Monterey County:** Arroyo Seco, 21-V-1955, J. W. Tilden, 1 ♀. **Placer County:** Alta, 25-VI-1933, R. M. Bohart, 1 ♂. **Riverside County:** San Jacinto River Canyon, 14-V-1939, E. C. Van Dyke, 1 ♀; Santa Margarita River, Temecula Canyon, 18-V-1968, E. I. Schlinger, 4 ♂, 4 ♀; **213-244 m**, L. Brattsten, 1 ♂, on wet sand; P. A. Rauch, 3 ♀; Temecula Canyon, 5 km NW Rainbow, 24-V-1968, M. E. Irwin, 1 ♀; Hemet Lake, 17-V-1959, J. C. Hall, 2 ♂, 2 ♀; Millard Canyon, 13-IV-1963, E. I. Schlinger, 1 ♂; 13 km N Junction of Deep Creek and Horsethief Creek, **902 m**, 9-16-V-1973, A. Tabet, 2 ♂; Riverside, 19-V-1964, F. G. Andrews, 1 ♂; 3-IV-1976, N. J. Reemer, 1 ♂; VI-1970, 1 ♂; Bautista Canyon, 13 km SE Hemet, 30-IV-1972, J. Pinto, 1 ♀; 8-V-1979, R. W. Parmelee, 1 ♂, 1 ♀; S. Frommer, 1 ♀; T. Augst-Allen, 1 ♀; San Jacinto Mountains, Idyllwild, 19-VI-1940, E. G. Linsley, 1 ♀. **San Bernardino County:** Thurman Flats, Mill Creek, San Bernardino Mountains, **1975 m**, 11-VII-1964, E. I. Schlinger, 1 ♂; Claremont, 1909, 1 ♂; no date, 4 ♂, 3 ♀; Mountain Home, 8-VI-1924, F. R. Cole, 1 ♂; 21-VI-1945, A. L. Melander, 1 ♂; Camp Baldy Road, **1981 m**, 25-I-1956, R. M. Bohart, 1 ♀; Wildwood Canyon, 8 km E

Calimesa, 16-VI-1969, M. E. Irwin, 1 ♀; Burns Canyon, 12 km NW Pioneer Town, 5-V-1981, N. J. Gunther, 1 ♂, 1 ♀; 11 km W Pioneer Town, **1554 m**, 5-V-1981, J. A. Bethke, 1 ♂; 7 km N Pioneer Town, **1250 m**, 5-V-1981, G. Pratt, 1 ♀; Mojave River Forks, 10 km SE Hesperia, 22-IV-1986, T. Nitta, 1 ♂; Towle, 25-VI-1933, M. C. Cazier, 1 ♂; Mt. Home Canyon, San Bernardino Mountains, 8-VI-1924, J. M. Aldrich, 2 ♀. **San Diego County:** Oakzanita Springs Park, **1189 m**, 25-V-1971, P. H. & M. Arnaud, 3 ♂, 1 ♀, flight trap; Palomar Observatory Campground, 25-27-VI-1968, P. H. Arnaud, 1 ♂; 1 ♀; **1524 m**, 26-VI-1968, P. H. Arnaud, 1 ♂; Nate Harrison Road near Mt. Palomar, **1463 m**, 2-VI-1968, E. I. Schlinger, 3 ♂, 3 ♀; **1067-1128 m**, L. Brattsten, 1 ♀; near San Vicente Reservoir, 10-VI-1965, J. C. Hall, 2 ♂, 7 ♀; 3 km W Potrero Canyon, 2-VI-1965, J. C. Hall, 1 ♂, 1 ♀, in copulo; near Buckman's Spring, 11-VI-1952, F. X. Williams, 1 ♀; San Vicente Reservoir, 16-VI-1965, M. E. Irwin, 2 ♀, on rock in shade, cold but active, overcast; Mission Gorge, 12-V-1960, G. C. Williams, 1 ♂; Pala, 7-V-1949, R. M. Bohart, 1 ♀. **San Luis Obispo:** 16 km W Simmler, 3-V-1962, J. Powell, 1 ♂; La Panza Canyon, 19 km NE Pozo, 2-V-1962, J. K. Drew, 1 ♀. **Tulare County:** Kern River Campground, about **884 m**, 11-V-1971, P. H. & M. Arnaud, 1 ♀. **Tuolumne County:** Basin Creek Campground, 31-V-1963, P. H. Arnaud, 1 ♀; 1-VI-1963, P. H. Arnaud, 2 ♂.

Nebritus powelli Webb and Irwin,

NEW SPECIES

Derivation of name.—This species is named in honor of Jerry A. Powell, University of California, Berkeley, who collected many of the specimens.

Diagnosis.—Males and females of *Nebritus powelli* are very similar to *N. tanneri* in having the scape cylindrical, dark reddish brown with gray pruinosity; the length of the scape less than 0.80 mm; the length/width ratio of the scape greater than 3.5.

Table 1. Morphometric variation in the various species of *Nebritus* (N = 10 for males and females of each species). The range (in mm) or ratio for each measurement is followed by the mean.

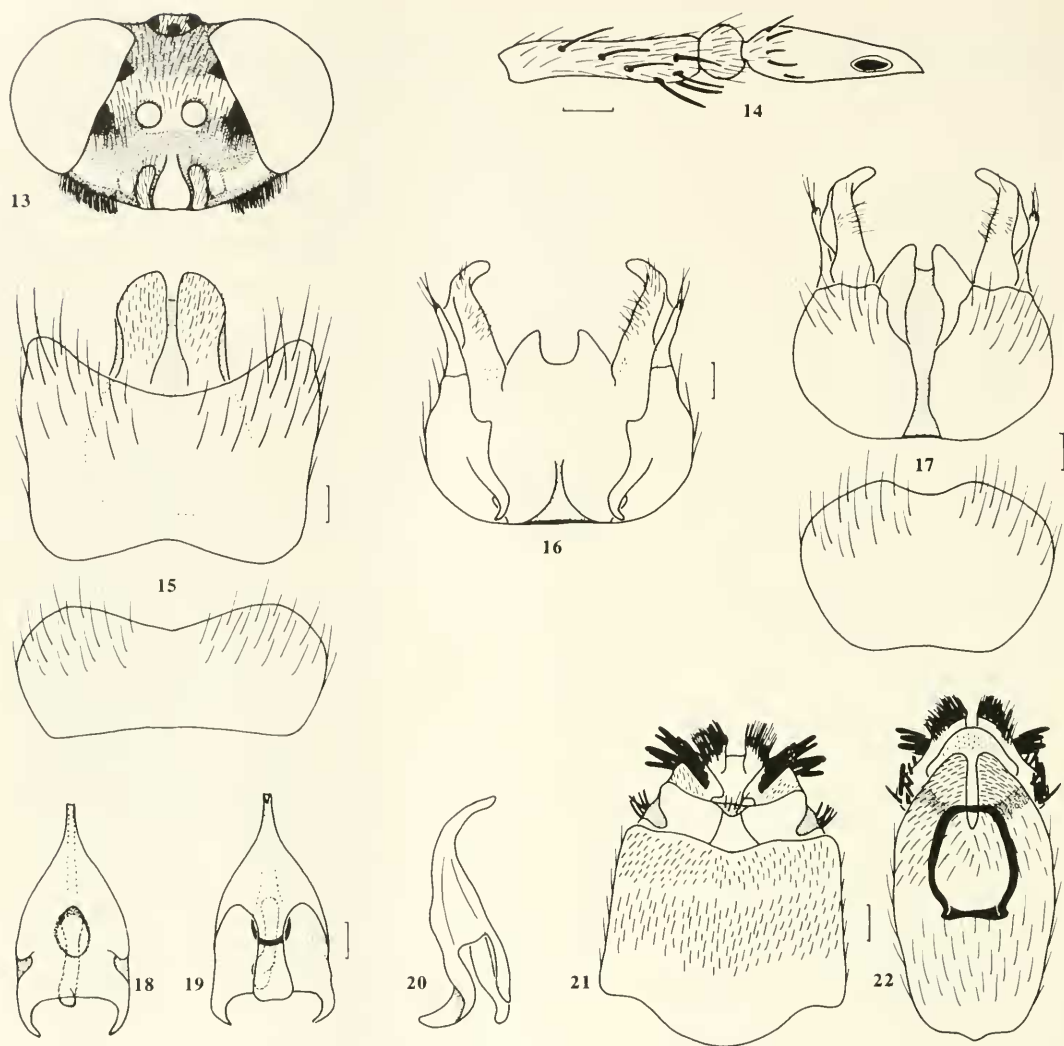
	<i>N. pellucidus</i>	<i>N. powelli</i>	<i>N. tanneri</i>
Males			
Total length, excluding antennae	6.2–8.9, 7.3	5.6–6.7, 6.3	5.3–7.8, 6.5
Head length	1.2–1.5, 1.3	0.8–1.2, 1.0	1.0–1.3, 1.2
Antennal length/head length	1.2–1.6, 1.3	1.0–1.2, 1.1	1.0–1.3, 1.1
Scape: length	0.82–1.10, 0.97	0.46–0.58, 0.51	0.56–0.78, 0.62
Scape: length/width	2.4–3.0, 2.7	3.7–4.8, 4.2	3.9–5.6, 4.7
Scape: length/length of pedicel	6.6–9.2, 7.6	4.0–5.6, 4.6	4.7–6.6, 6.1
Pedicel: length	0.12–0.14, 0.13	0.10–0.12, 0.11	0.10–0.12, 0.10
Pedicel: length/width	0.6–1.0, 0.9	0.7–1.0, 0.9	0.6–1.0, 0.7
Flagellum: length	0.58–0.70, 0.65	0.38–0.44, 0.40	0.46–0.62, 0.55
Flagellum: length/width	4.0–4.7, 4.4	2.7–3.8, 3.3	3.0–4.4, 3.8
Flagellum: length/scape length	0.6–0.7, 0.7	0.8–0.9, 0.8	0.7–1.0, 0.9
Maxillary palp: length	0.42–0.60, 0.49	0.40–0.50, 0.45	0.42–0.60, 0.48
Maxillary palp: length/width	3.8–6.8, 6.1	3.1–4.2, 3.9	2.6–5.0, 3.6
Wing: length	5.3–6.0, 5.8	4.2–5.2, 4.7	4.5–6.3, 5.6
Wing: length/width	3.1–3.9, 3.3	2.8–8.4, 3.2	2.7–3.5, 3.1
Females			
Total length, excluding antennae	7.8–10.0, 9.1	6.3–8.4, 7.1	6.5–8.9, 8.0
Head length	1.2–1.4, 1.4	0.9–1.1, 0.9	1.0–1.3, 1.1
Antennal length/head length	1.3–1.6, 1.5	1.0–1.2, 1.1	1.1–1.3, 1.2
Scape: length	0.90–1.22, 1.03	0.44–0.70, 0.56	0.58–0.76, 0.66
Scape: length/width	2.1–3.4, 2.6	4.0–5.3, 4.6	4.1–5.4, 4.9
Scape: length/length of pedicel	6.8–8.7, 7.5	4.4–7.0, 5.3	5.1–7.8, 6.3
Pedicel: length	0.12–0.16, 0.14	0.10–0.12, 0.11	0.08–0.14, 0.11
Pedicel: length/width	0.7–1.0, 0.9	0.7–1.0, 0.8	0.6–1.0, 0.8
Flagellum: length	0.68–0.88, 0.79	0.36–0.48, 0.40	0.49–0.66, 0.57
Flagellum: length/width	4.3–6.3, 4.9	2.3–3.4, 3.0	3.0–4.6, 3.9
Flagellum: length/scape length	0.6–1.0, 0.7	0.6–0.8, 0.7	0.7–1.0, 0.9
Maxillary palp: length	0.34–0.52, 0.46	0.38–0.54, 0.45	0.46–0.68, 0.52
Maxillary palp: length/width	4.3–6.5, 5.8	3.2–3.7, 3.6	3.1–5.2, 4.0
Wing: length	5.7–6.7, 6.1	4.7–6.2, 5.1	4.5–6.5, 5.8
Wing: length/width	3.2–3.9, 3.4	2.9–4.0, 3.3	2.6–3.5, 3.1

Nebritus powelli is separated from *N. tanneri* in having the thorax with a broad median band of white setae; the scutellum with a lateral patch of white setae; and sternite 8 in males is subquadrate with the posterior margin shallowly emarginate; the gonocoxite lacks a distinctive posteromedial patch of black setae in ventral view; and the ejaculatory apodeme is narrow, not expanded anteriorly.

Description of holotype male (6335).—Body length 5.8 mm.

Head: Length 0.9 mm. Ocellar tubercle black, glossy; ocellar setae black, elongate, scattered. Eyes reddish brown, median mar-

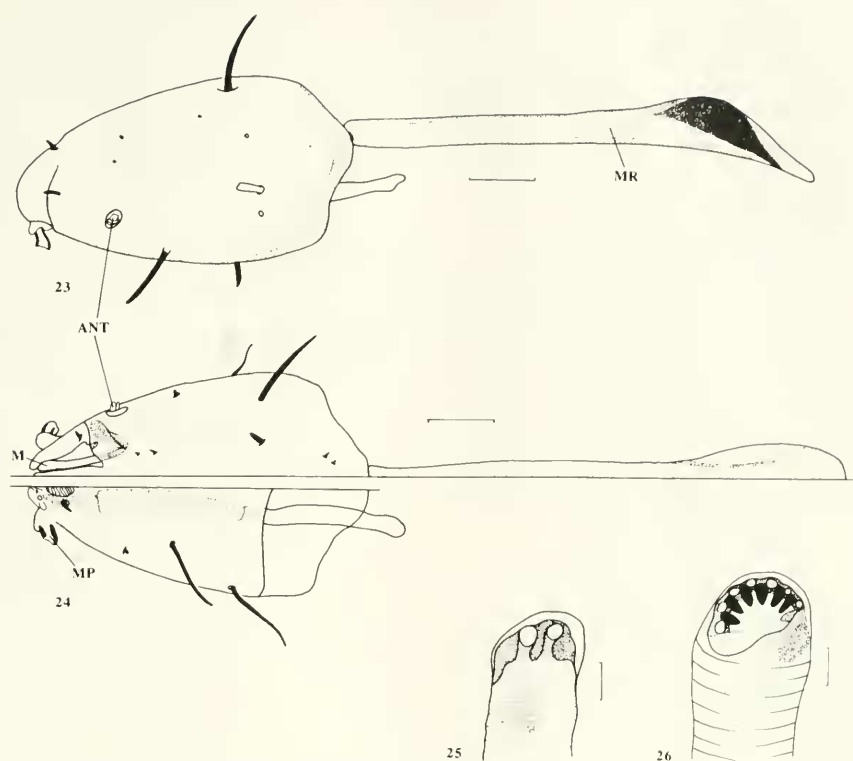
gin of eyes straight. Frons (Fig. 13) brownish gray pruinose on dorsal two-thirds and surrounding lateral half of antennal bases and dark reddish brown to black, glossy on ventral third of frons; a dark brown pruinose area exists dorsolaterally on frons and silver pile extends laterally from antennal bases to margin of eyes; setae black, elongate, scattered over entire frons. Antenna (Fig. 14) dark brown, brownish gray pruinose; setae dark brown, scattered over scape, pedicel and basally on flagellum; macrosetae black, scattered on scape; length of antenna 1.1 times head length; length of scape 0.46 mm, 3.8 times width, 4.6 times length of



Figs. 13–22. *Nebritus powelli* (6335, 6358) 13. Male face, frontal view. 14. Male antenna, lateral view. 15. Male tergite 8, epandrium, cerci, and hypoproct, dorsal view. 16. Male hypandrium, gonocoxite and gonostylus, dorsal view (aedeagal complex removed). 17. Male sternite 8, hypandrium, gonocoxite and gonostylus, ventral view. 18. Male aedeagus, dorsal view. 19. Male aedeagus, ventral view. 20. Male aedeagus, lateral view. 21. Female terminalia, dorsal view. 22. Female terminalia, ventral view. Scale = 0.1 mm, unless otherwise indicated.

pedicel; length of pedicel 0.10 mm, 0.8 times width; length of flagellum 0.38 mm, 2.7 times width, 0.8 times length of scape; style length 0.04 mm. Parafacial with dense, white to gold pile; tentorial pit large, dark reddish brown, glossy. Genal setae white. Maxillary palp dark brown, gray pruinose; length 0.40 mm, 4.0 times width; setae dark yellow.

Thorax: Macrosetae: np 3, sa 1, pa 1, dc 1, sc 2. Dark brown, gray pruinose; mixture of white, lanceolate, subappressed setae and dark brown, elongate setae over entire dorsum; vittae dark brown, dorsocentral and dorsolateral vittae separated by gray pruinose stripe. Postpronotal lobe concolorous with thorax; setae pale yellow, elongate.

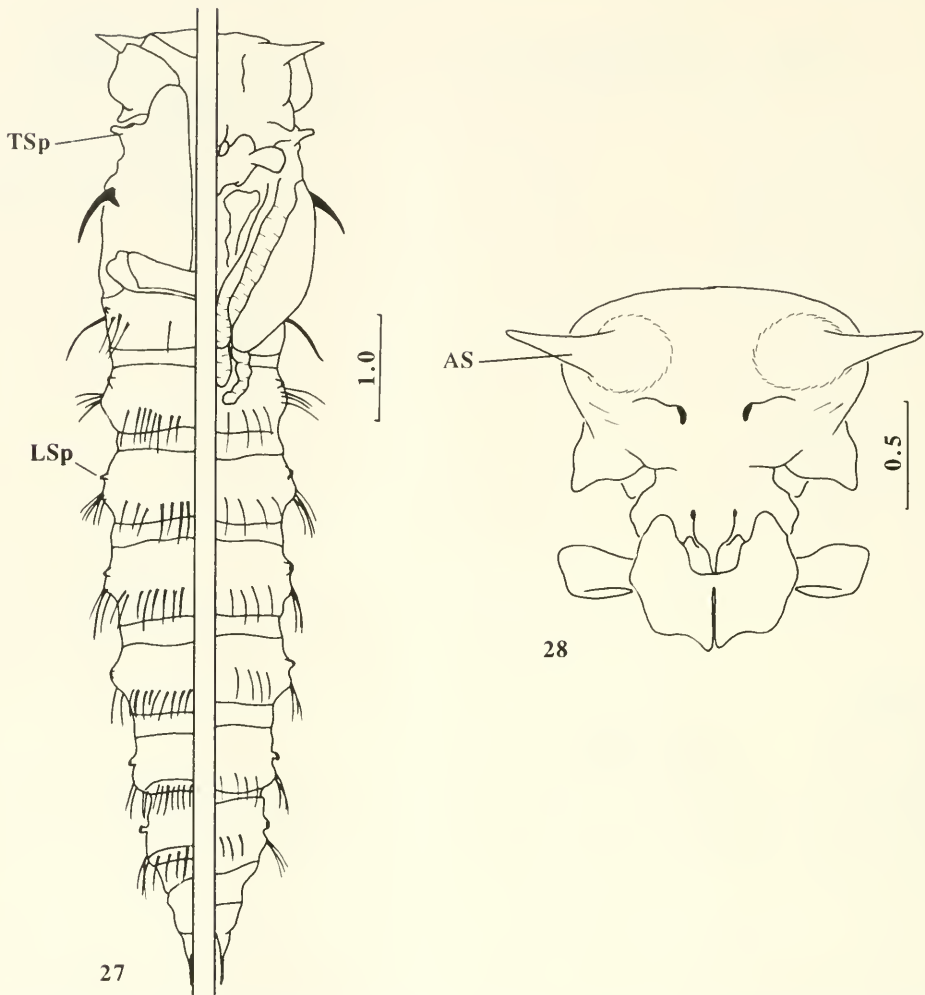


Figs. 23–26. *Nebritus powelli* larva (6351) 23. Head capsule, lateral view. 24. Head capsule, dorsal view (right), ventral view (left). 25. Prothoracic spiracle, lateral view. 26. Posterior spiracle, dorsolateral view. Abbreviations: Antenna (ANT); Mandible (M); Maxillary Palpus (MP); Metacephalic Rod (MR). Scale = 0.1 mm, unless otherwise stated.

Prosternal setae white. Pleuron dark brown, dense gray pruinose; setae white, elongate, abundant on propleuron, scattered over entire anepisternum although more dense dorsally, scattered over entire katapisternum although more abundant along anterior margin. Scutellum dark brown; setae white to pale yellow with lateral patch of white setae. Laterotergite dark brown, dense gray pruinose; setae pale yellow with scattered dark brown setae. **Wing:** Length 4.3 mm, 3.3 times width; opaque, pale smoky brown, concolorous; pterostigma slightly darker than membrane. Halter dark brown, stalk yellowish brown. **Legs:** Coxae dark brown, dense gray pruinose, apical macrosetae dark brown. Femora dark brown, gray pruinose; setal pattern a mixture of scattered, white,

and dark brown, elongate setae and white, appressed, lanceolate setae. Tibiae dark yellowish brown, apical half of foretibia, apical fourth of middletibiae, and apex of hindtibia dark brown. Tarsi dark brown, basal fourth of hind basitarsus dark yellowish brown.

Abdomen: Dark brown, gray pruinose, concolorous; dorsal setae dark brown, subappressed; lateral setae dark brown, elongate with scattered pale yellow lanceolate setae. **Terminalia** (Figs. 15–20): Tergite 8 broad; posterior margin broadly emarginate. Sternite 8 subquadrate, posterior margin shallowly emarginate. Gonocoxite lacks posteromedian patch of black setae as seen in ventral view. Ejaculatory apodeme narrow, not expanded anteriorly.



Figs. 27, 28. *Nebritus powelli* pupal exuvia (6351) 27. Exuvium, dorsal view (left), ventral view (right). 28. Frontal plate, frontal view. Abbreviations: Antennal Sheath (AS); Lateral Spiracle (LSp); Thoracic Spiracle (TSp). Scale = 0.1 mm, unless otherwise stated.

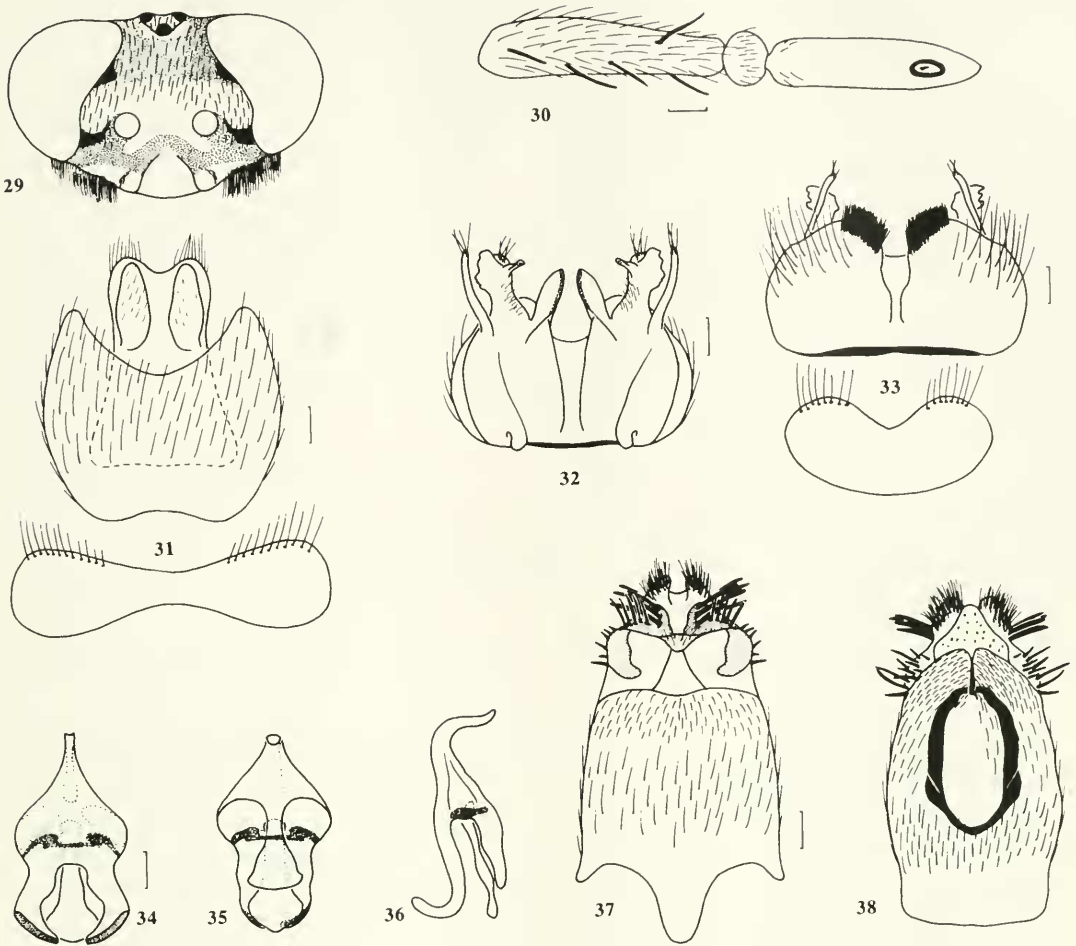
Variation: Body measurements given in Table 1. **Thorax:** Macrosetae: np 3, sa 1-2, 2, pa 1, dc 1, sc 2.

Description of female.—Similar to male with following exceptions. Body measurements given in Table 1.

Head: Ocellar tubercle dark reddish brown, dark gold pruinose; setae dark reddish brown, scattered. Frons dark reddish brown, dorsal half dark gold pruinose, ventral half silver gray pruinose; dark yellow and dark reddish brown setae, moderately long, scattered. Maxillary palp pale yellow-

ish brown. **Thorax:** Macrosetae: np 2-3, 3, sa 2, pa 1, dc 1-2, 1 sc 2. Dark gold and black setae on mesonotum, dark gold setae subappressed. **Legs:** Foretibia dark yellowish brown, apical fourth dark reddish brown. **Abdomen:** Dark reddish brown, dense gray pruinose along posterior third of each tergite. **Terminalia** (Figs. 21, 22): Furca (Fig. 22) oval; anterior and posterior margins truncate; lateral margins rounded.

Immature stages.—**Larva** (N = 2) (Figs. 23-26): Length 0.50-0.54 mm, 1.5 times longer than wide; metacephalic rod elon-



Figs. 29–38. *Nebritus tanneri* (6172, 6198) 29. Male face, frontal view. 30. Male antenna, lateral view. 31. Male tergite 8, epandrium, cerci, and hypoproct, dorsal view. 32. Male hypandrium, gonocoxite and gonostylus, dorsal view (aedeagal complex removed). 33. Male sternite 8, hypandrium, gonocoxite and gonostylus, ventral view. 34. Male aedeagus, dorsal view. 35. Male aedeagus, ventral view. 36. Male aedeagus, lateral view. 37. Female terminalia, dorsal view. 38. Female terminalia, ventral view. Scale = 0.1 mm, unless otherwise indicated.

gate, posterior third clavate, length 0.82–0.84 mm, 1.6 times length of head. Prothoracic spiracle (Fig. 25). Posterior spiracle (Fig. 26).

Pupa (N = 4) (Figs. 27, 28). Length 7.8–9.3, 8.7 mm, width 1.8–2.2, 2.0 mm. Alar process not spinose. Labial sheath tapered ventrally, bisecting proboscis sheath. Length of antennal sheath 0.42–0.46, 0.45 mm, apical spine absent. Thoracic spiracle short, truncate apically; length 0.14–0.21, 0.17 mm. Posterior spines elongate, not di-

vergent apically, length 0.27–0.36, 0.32 mm. Dorsal spines on abdominal segments I–VII and ventral spines on segment II–VII fine, not fused basally. Abdominal spiracles on segments I–VII moderately thick, tubular.

Seasonal activity.—In the specimens examined, adults were collected from 10 January to 19 July, with several specimens collected on dunes and on *Salix* sp.

Distribution (Fig. 40).—*Nebritus powelli* is known only from the coastal dunes of central California.

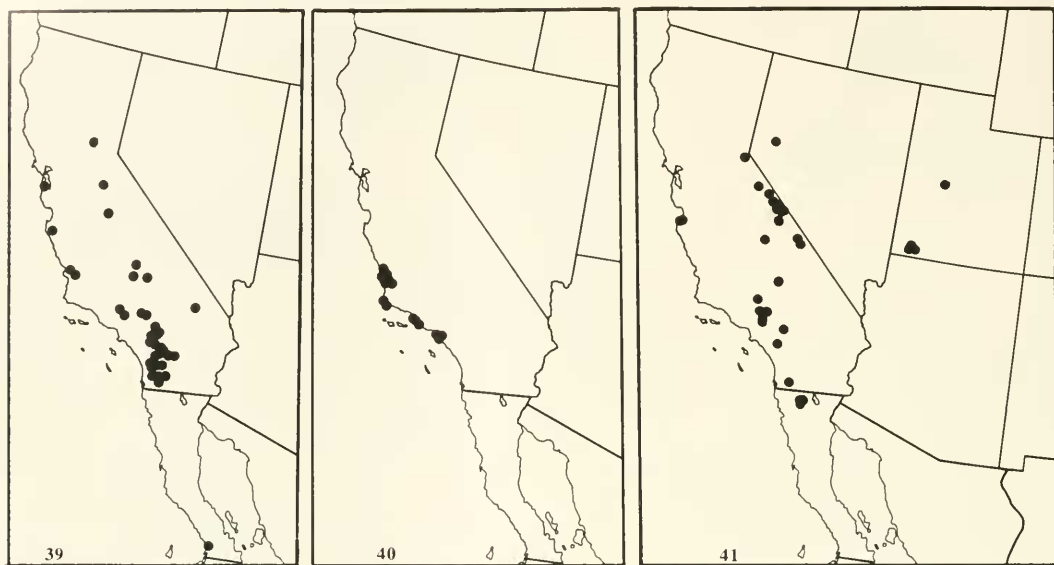


Fig. 39. *Nebritus pellucidus*, distribution.

Fig. 40. *Nebritus powelli*, distribution.

Fig. 41. *Nebritus tanneri*, distribution.

Specimens examined (N = 180).—**Type material:** The holotype male of *Nebritus powelli* (CAS Type No. 16630) (M. E. Irwin Therevidae Specimen Number 6335) was collected at Oxnard, Ventura County, California on 14 March 1969 by J. T. Doyen.

Other material: Paratypes (N = 79) (CAS, CNC, FSCA, INHS, LACM, MEI, OregSU, UCB/CIS, USNM) **UNITED STATES. CALIFORNIA. Los Angeles County:** Balona Wetlands near Playa del Rey, 15-III-1981, C. Nagano, 1 ♂; 28-III-1981, C. Nagano, 3 ♂, 1 ♀; 16-II-1981, C. Nagano, 3 larvae collected, emerged 24-III-1981, 1 ♂, emerged 4-IV-1981, 1 ♂, emerged 6-IV-1981, 1 ♂; Playa del Rey, 10-I-1948, J. Wilcox, 1 ♂. **San Luis Obispo:** Dune Lakes, 5 km S Oceano, 15-II-1974, J. Doyen & J. Powell, 12 ♂, 6 ♀, on *Salix* sp.; 20-III-1974, 3 ♂, 2 ♀; 24-IV-1973, 4 ♂, 3 ♀; 27-IV-1973, 9 ♂; 1-VI-1972, 1 ♂; 26-27-IV-1973, 2 ♂, 2 ♀; 24-II-1975, 1 ♀; 30-IV-1-V-1975, J. Doyen, 2 ♀; 21-V-1976, J. Doyen & P. Rudi, 4 ♂, 1 ♀; Dune Lakes, 11 km S Oceano, 20-V-1972, J. D. Pinto, 1 ♂, on dunes; 4-5-VI-1971, 2 ♂; Oso Flaco Lake, coastal dune

association, 22-VI-1965, M. E. Irwin, 3 ♂; 19-VII-1964, 2 ♀; 22-VI-1965, K. W. Brown, 1 ♀; Oso Flaco Lake, 8 km S Oceano, 11-V-1965, J. Powell, 2 ♂, 5 ♀; 27-VI-1968, D. Veirs, 3 ♂, 2 ♀; J. A. Chemsak, 1 ♂, 1 ♀; J. Powell, 6 ♂, 2 ♀; 11-V-1965, J. Powell, 1 ♀; 23-IV-1966, J. Powell, 1 ♂; Morro Bay, 30-IV-1962, S. W. Thorp, 1 ♀; C. A. Toschi, 1 ♀; P. D. Hurd, 2 ♂; J. Powell, 4 ♂; J. K. Drew, 1 ♂; 28-IV-1968, J. Powell, 1 ♂; 2-V-1962, C. A. Toschi, 1 ♂, 2 ♀; Grover City, 27-IV-1969, E. G. Linsley, 1 ♀; 27-IV-1959, 1 ♂; 28-IV-1959, J. W. MacSwain, 1 ♂; Pismo State Beach at Grover City, 1-V-1975, J. Doyen, 1 ♂, 1 ♀; Morro Bay State Park, 3-V-1974, J. Powell, 2 ♂, 1 ♀; 5 km S Oceano, 23-II-1975, J. Powell, 5 ♂, 1 ♀; 20-III-1974, J. Doyen & J. Powell, 1 ♂; Oceano, 27-V-1970, J. Wilcox, 30 ♂, 4 ♀; 24-IV-1951, R. M. Bohart, 1 ♂; Baywood Park, 26-IV-1969, J. D. Pinto, 2 ♂, 1 ♀; 2 km N Morro Bay, 20-V-1970, J. Wilcox, 1 ♀; Pismo Beach, 13-V-1956, J. Wilcox, 1 ♂. **Santa Barbara County:** Jalama Beach Park, 27-III-1968, P. H. Arnaud, 7 ♂, 2 ♀. **Ventura County:** Oxnard, 14-III-1969, J. T. Doyen, 2 ♂, 1 ♀; 3

km NW Ventura, 13-III-1967, J. Powell, 1 ♂, 1 ♀; Punta Corda, 6-V-1973, J. Doyen, 2 ♂; McGrath State Beach W of Oxnard, pupa collected 15-II-1982, emerged 23-II-1982, C. Nagano, 1 ♀.

***Nebritus tanneri* (Hardy)**

Zionea tanneri Hardy (1938: 144); Cole (1965: 349); Irwin and Lyneborg (1981a: 249). Type locality: Zion National Park, Utah.

Nebritus tanneri (Hardy); Irwin and Lyneborg (1981a: 249).

Derivation of name.—This species was named in honor of Dr. V. M. Tanner.

Diagnosis.—Males and females of *Nebritus tanneri* are very similar to *N. powelli* in having the scape cylindrical, dark reddish brown, gray pruinose, the length of the scape less than 0.80 mm; the length/width ratio of the scape greater than 3.5. Unlike *Nebritus powelli*, *N. tanneri* has scattered, dark reddish brown setae on the median area of thorax; a lateral patch of gold setae on the scutellum; and sternite 8 in males is broad, bilobed; the gonocoxite has a distinctive posteromedial patch of black setae as seen in ventral view; and the ejaculatory apodeme is broadly expanded anteriorly.

Description of holotype female (7000).—Body length 6.5 mm.

Head: Length 1.0 mm. Ocellar tubercle dark reddish brown, glossy; ocellar setae dark yellow, elongate, scattered. Eye reddish brown; median margin sinuate. Frons (Fig. 29) pollinose on dorsal two-thirds, ventral third dark reddish brown, glossy; a black pruinose area exists dorsolaterally and silver pile extends laterally from antennal bases to margin of eyes; setae variable, gold, elongate, scattered over pollinose area and dark reddish brown on dark reddish brown area of frons. Antenna (Fig. 30) dark brown, gray pruinose; setae dark brown, scattered over scape and pedicel and basally on flagellum; macrosetae dark brown, scattered on scape; length of antenna 1.2 times head length; scape cylindrical, elongate, length

0.62 mm, 5.2 times width, 7.8 times length of pedicel; length of pedicel 0.08 mm, 0.7 times width; length of flagellum 0.54 mm, 4.5 times width, 0.9 times length of scape; style length 0.04 mm. Parafacial pollinose, median and tentorial pit areas dark reddish brown, glossy. Genal setae white. Maxillary palp dark yellow; length 0.52 mm, 5.2 times width; setae dark yellow.

Thorax: Macrosetae: np 3, sa 2, pa 1, dc 1, sc 2. Dark brown, gray pruinose; setae dark brown, fine, scattered with a broad lateral band of gold lanceolate setae; vittae dark brown, dorsocentral and dorsolateral vittae separated by broad yellowish brown pruinose stripe. Postpronotal lobe concolorous with thorax; setae gold, lanceolate. Prosternal setae white. Pleuron dark brown, dense gray pruinose; setae white, elongate, abundant on propleuron, scattered over entire anepisternum and katapisternum. Scutellum dark brown; setae pale yellow, dense laterally. Laterotergite dark brown, dense gray pruinose; setae white. **Wing:** Length 4.5 mm, 2.6 times width; pale brown, concolorous, costal cell darker; pterostigma dark brown. Halter brown, stalk pale yellow. **Legs:** Coxae dark brown, dense gray pruinose, apical macrosetae dark reddish brown. Fore and middle femora dark reddish brown, gray pruinose, apical fourth dark yellow; hind femur dark yellow; setal pattern a mixture of scattered, white, and dark brown, elongate setae and white, appressed, lanceolate setae, hind femur lacks white, elongate setae. Tibiae dark yellow, apex reddish brown; tarsomere 1 dark yellow, apex dark reddish brown; tarsomeres 2–5 dark brown.

Abdomen: Dark brown, gray pruinose; lateral margins dense gray pruinose; dorsal setae dark yellow, subappressed; lateral setae white, fine. **Terminalia** as in Figs. 37, 38. Furca, as in Fig. 38, oblong; posterior margin truncate; anterior margin broadly rounded; lateral margins parallel.

Variation: Body measurements given in Table 1. **Thorax:** Macrosetae: np 2–4, 3, sa 2–3, 2, pa 1, dc 1, sc 2.

Description of male.—Similar to female with following exceptions. Body measurements given in Table 1.

Head: Frons (Fig. 29) with mixture of dark yellow and dark brown setae on pruinose area, black setae on dark reddish brown area.

Thorax: Macrosetae: np 3–4, 4, sa 1–2, pa 1, dc 1, sc 2. Gold setae across anterior margin of mesonotum. **Legs:** Tibiae and tarsi dark reddish brown.

Abdomen: Terminalia (Figs. 31–36): Tergite 8 broad, bilobed. Sternite 8 bilobed, constricted medially. Gonocoxite with distinct posteromedian patch of black setae in ventral view. Ejaculatory apodeme broadly expanded anteriorly.

Immature stages.—Unknown.

Seasonal activity.—In the specimens examined, adults were collected from 11 April to 27 July. Adults have been collected on *Pinus monophylla*, on dunes and sandy creek bottoms, and in Malaise traps.

Distribution (Fig. 41).—*Nebritus tanneri* ranges from Baja California Norte to north-central California, and eastward to western Nevada and southwestern Utah.

Specimens examined (N = 63).—**Type material:** The holotype female (Brigham Young University) (M. E. Irwin Therevidae Specimen Number 7000) was collected in Zion National Park, Utah by V. M. Tanner.

Other material: MEXICO. **Baja California Norte:** 6 km S La Rumorosa, 18-IV-1964, E. I. Schlinger, 3 ♂; **1321 m**, sandy creek bottom, M. E. Irwin, 3 ♂. UNITED STATES. CALIFORNIA. **El Dorado County:** Eagle Falls, **1980 m**, 27-VI-1971, P. H. & M. Arnaud, 1 ♂; Grass Lake, 5-VII-1962, M. E. Irwin, 1 ♂. **Inyo County:** Panamint Mts., 24-V-1937, A. E. Meier, 1 ♂; Whitney Portal, 16-VI-1958, M. E. Irwin, 1 ♀; 6 km E Whitney Portal, 31-V-1963, E. Fisher, 2 ♀; 14 km E Whitney Portal, 31-V-1963, E. Fisher, 2 ♂; Bigpine, **2286–2591 m**, 6-VII-1956, J. Wilcox, 1 ♂, 1 ♀; Big Pine Creek, **2286 m**, 12-VI-1942, R. Bohart, 1 ♂. **Kern County:** Canebreak Creek, 5 km W Walker Pass, 30-IV-1964, J. Powell, 1 ♂; C. A. Toschi, 1 ♀; Tehachapi Mountains, Antelope

Canyon, **1465–1585 m**, 15-V-1976, J. D. Pinto, 1 ♂. **Los Angeles County:** 8 km S Lancaster, 11-IV-1958, J. W. MacSwain, 1 ♂; Palmdale, Mojave Desert, 13-IV-1940, E. I. Schlinger, 1 ♀; Devil's Punchbowl, 1-V-1968, D. Veirs, 1 ♀. **Mono County:** Rock Creek Campground, 3-VII-1967, P. H. Arnaud, 5 ♀; Blanco's Corral, White Mt., **3048 m**, 30-VI-1953, J. W. MacSwain, 1 ♂, 3 ♀; H. Nakakihara, 1 ♀; Crooked Creek Laboratory, White Mt., 5 km N Inyo County line, 24-V-1937, J. Powell, 1 ♀; 8 km S Lancaster, 11-IV-1958, J. W. MacSwain, 1 ♂; Benton Inspection Station, 14-V-1974, B. Villegas, 2 ♂; Leavitt Meadow, 6-VII-1951, C. A. Downing, 1 ♀; Mono Basin, Sulphur Spring Road, 16 km S Highway 167, dune, 29-V-1980, 1 ♀; 2-VI-1980, T. W. Schoener & C. A. Taft, 1 ♂, 1 ♀; Crooked Creek, White Mountains, **3094 m**, 19-VI-1961, J. A. Litsinger, 1 ♀. **Monterey County:** Marina, coastal sand dune association, 10-V-1971, M. E. Irwin, 4 ♂, 5 ♀. **Riverside County:** Pine Cove, San Jacinto Mountains, 23-V-1939, B. Brookman, 1 ♀. **San Diego County:** Cuyumaca, 12-V-1953, J. Wilcox, 1 ♂. **San Bernardino County:** March's Ranch Road, 3 km E Baldwin Lake, **1524–1829 m**, *Pinus monophylla*, 25-V-1968, R. Hobza, 1 ♀. **Tulare County:** Fairview, 27-IV-1964, C. A. Toschi, 2 ♂, 1 ♀; Kings Canyon National Park, Big Meadow Camp, along trail to Weaver Lake, **2134 m**, 27-VII-1979, L. G. Bezarh, 1 ♂, 1 ♀. NEVADA. **Churchill County:** 8 km SE Hazen, 2-V-1958, R. C. Bechtel, 1 ♀. UTAH. **Millard County:** Lake Dale Haws, Delta, 24-VI-1951, 1 ♂. **Washington County:** Zion National Park (holotype), V. M. Tanner, 1 ♀; Paradise Canyon, 13–19-V-1983, D. Beck, 1 ♂, Malaise trap.

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